DOCUMENT RESUME

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PUB DATE 80

NOTE 34p.; For related documents, see SE 032 884-887 and ED 178 351. Contains occasional broken type. Photographs may not reproduce well.

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ABSTRACT

This guide describes the construction and use of 12 learning stations dealing with habitats and people's impact upon them. At each station, students observe photographs or a model and then answer questions on a data sheet based upon the display. The booklet contains instructions for building each exhibit along with a materials list, estimated cost, and a photograph of the completed display. Also provided are background information and questions for teachers to use in follow-up discussions. In addition, a habitat quiz and sample student data sheet are included. (WB)

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INTRODUCTION

The Habitat Seminar was designed and built by the staff of Quarry Hill Nature Center of Rochester, Minnesota. The costs of construction were underwritten by the Region X Environmental Education Council and IBM Corporation. The program was first used in 1976 and since that time has been available for loan to schools in Region X. Nearly 12,000 students and adults have participated in the program.

The program consists of 12 learning activities which require participation by the user. These activities deal with the single habitat which man and animal must share. The hoped for result is increased understanding of the problems of a shared habitat.

This booklet contains the information necessary to duplicate this set of activities. Included are construction diagrams, photographs, and descriptions as well as a materials list and approximate cost. Also included is the text of a sign which gives directions to the participant on how to carry out the activity.

The Student Data Sheets, Teacher Data Sheets, Habitat IQ Quiz and Answer Sheet are also included. They may be reproduced as necessary.

Not included in the cost estimate are nails, glue and paint. Construction can be as simple or as complicated as the skill of the builder allows.

Lettering can be done in a number of ways; check with the art teacher or the art supply store for possibilities. You can obtain further information by contacting the Director, Quarry Hill Nature Center, 701 Silver Creek Road NE, Rochester, MN 55901, (507) 289-1687.

The photographs in this booklet were done by Larry Meyer of Quarry Hill Nature Center, construction drawings done by John Lodermier and Gerri Meyer of Rochester Area Vocational Technical Institute, typing and layout of booklet by Idelle Manthei of Quarry Hill Nature Center.

HABITAT ACTIVITY 1 - LAYER CAKE LAKE

MATERIALS

6 sq.ft. 1/2" AD plywood
6 sq.ft. 1/8" plexiglass
10 lineal ft. 1 x 3" pine
12 screws/finishing washers
3 lbs. plaster
Model trees
Assorted letters & numbers

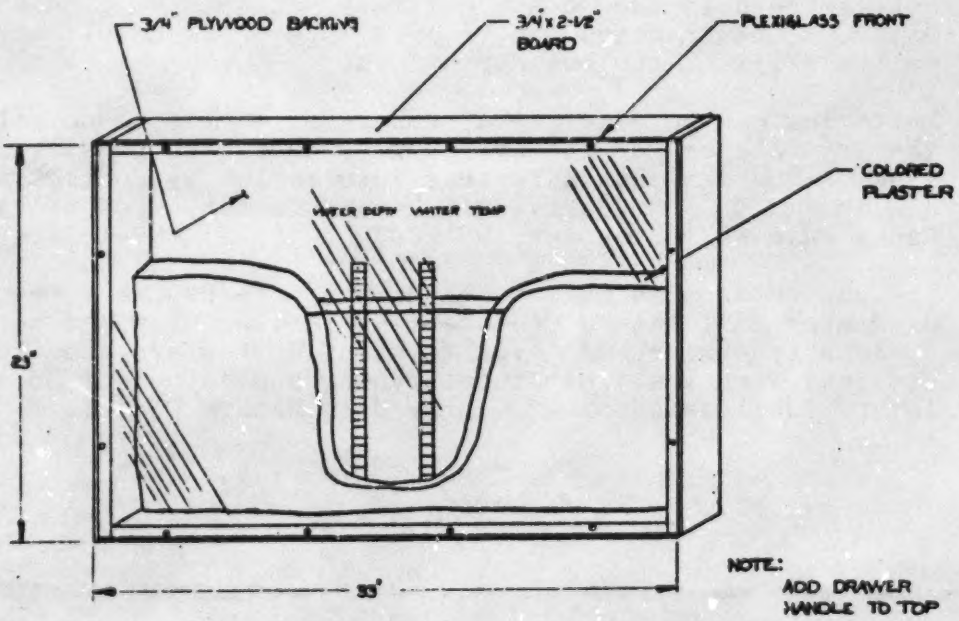
Approximate Cost $23.00

DIRECTIONS SIGN

LAYER CAKE LAKE
The water in many deep lakes forms layers during the summer. You can't see these layers but you can find them by measuring the water temperatures. Can you find the layers in this lake model?

DESCRIPTION

This model represents the cross-section of a deep northern lake. It is made by pouring moulding plaster on the plywood background. The two scales in the lake show temperature and depth. The area of rapid change of temperature is where the layer (thermocline) occurs. To make sure the plaster clings to the wood, put several tacks or staples into the wood before pouring the plaster.



HABITAT ACTIVITY 2 - DIRTY WATER

MATERIALS

2 4"x24" plastic pipe
2 sq.ft. plexiglass
2 ring stands
4 rings for ring stands
2 light meters
6 ft. aquarium tubing
2 squeeze bulbs
2 light fixtures

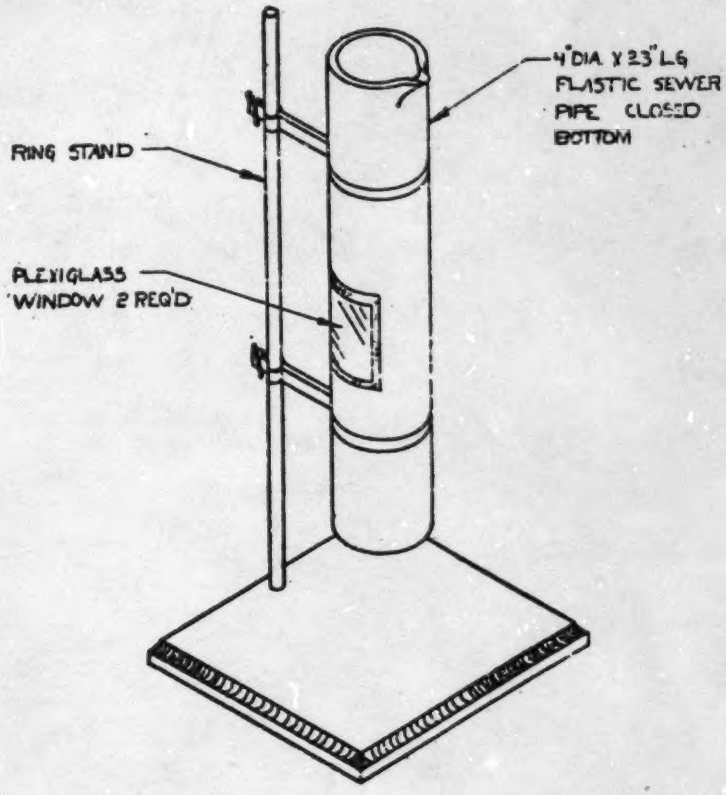
Approximate Cost $130.00

DIRECTIONS SIGN

DIRTY WATER
Here are 2 tubes containing water. Tube A contains clean water and Tube B contains dirty water. How does light penetrate each column of water? Read the light meter at the bottom of each tube and record the answer on the Data Sheet.

DESCRIPTION

Two pieces of 4" pipe hold the dirty and clean water. Each pipe has a plexiglass cover epoxied onto its bottom and two plexiglass windows in each side. These are bent to the curve of the pipe and held with silicone glue. The plexiglass bottom is to allow light to go through the water to the light meter which is beneath the tube. A slurry of clay in one tube will cut down the light so that the difference can easily be seen on the meter. If the dirt in the water settles, it can be kept in suspension by inserting a plastic tube into the bottom of the container and squeezing the bulb.



HABITAT ACTIVITY 3 - MAN OR BEAST

ACTIVITY 3 - MAN OR BEAST (CONT'D)

MATERIALS

17 sq.ft. 1/2" AD plywood
28 lineal ft. 1 x 2" pine
8 sq.ft. 3/4" AD plywood
4 lineal ft. 1 x 3" pine
8 sq.ft. 1/8" plexiglass
12 8x10 photographs

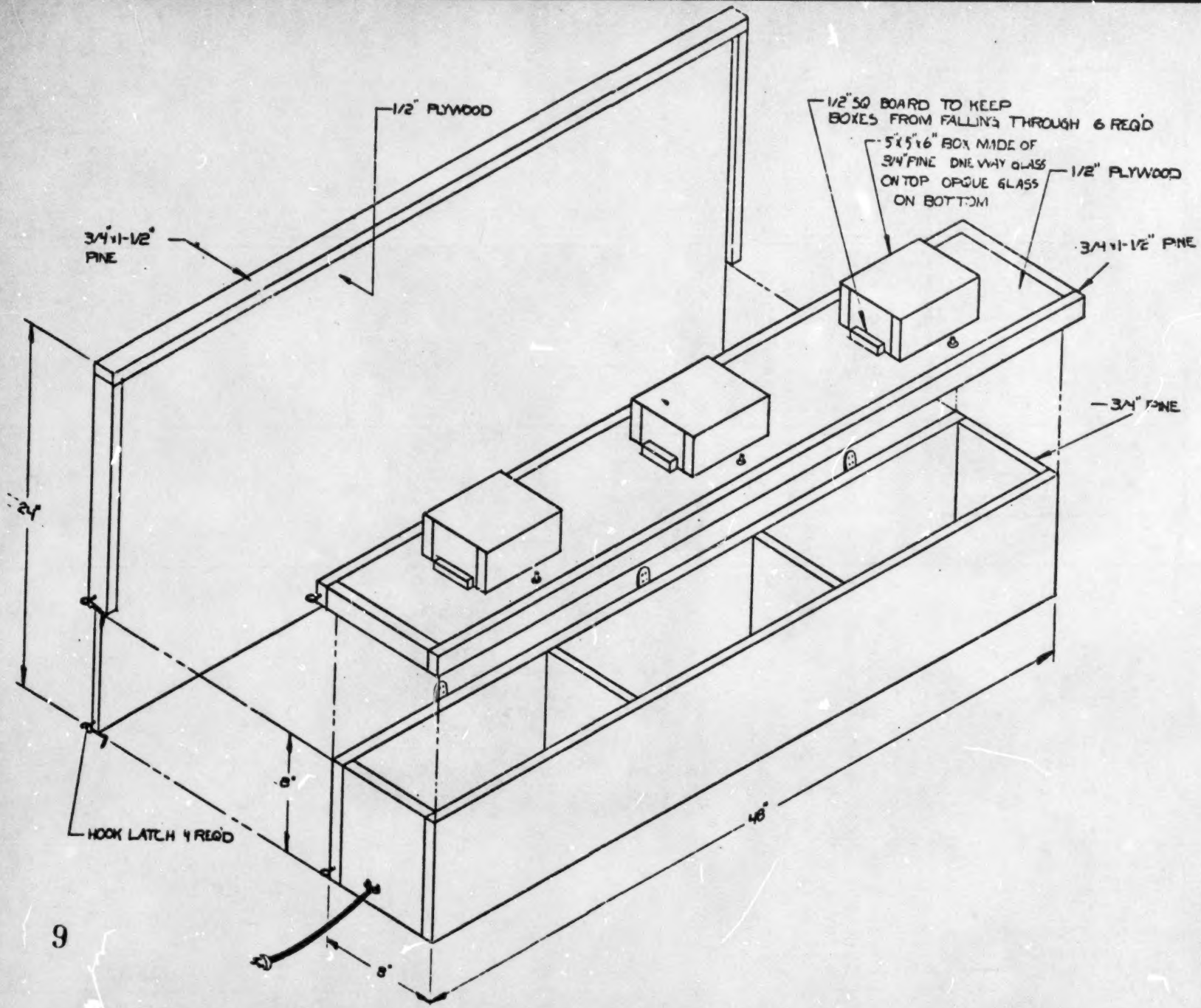
Approximate Cost $71.00

DIRECTIONS SIGN

MAN OR BEAST
In this activity you see 2 rows of pictures. The lower row shows animals which must share their habitat with man. The top row shows some things made by man in this shared habitat. Match the animal which is most affected by the man-made object or condition. Put your answers on the Data Sheet.

DESCRIPTION

Six pictures of animals are glued to 3/4" plywood which in turn are screwed to one of the 1 x 6' panels. The animals are fish, deer, fox, pheasant, ground squirrel and migrating geese. The second set of 6 pictures are on the second 1 x 6' panel. They include a blacktopped parking lot, a freeway fence, intensive farming, a transmission tower, a river dam and a clear-cut forest. The photographs are all covered with plexiglass. The two panels are hung on a standard as shown in the construction diagram.


1/2" PLYWOOD
1/2" SQ BOARD TO KEEP BOXES FROM FALLING THROUGH 6 REQ'D
5"x5"x6" BOX MADE OF 3/4" FINE ONE WAY GLASS ON TOP OPQUE GLASS ON BOTTOM
1/2" PLYWOOD
3/4"x1-1/2" PINE
3/4"x1-1/2" PINE
3/4" PINE
24"
8"
HOOK LATCH 4 REQ'D
48"
8"

ACTIVITY 4 - THREE HABITATS (CONT'D)

MATERIALS

20 sq.ft. 1/2" AD plywood
9 sq.ft. 1/8" plexiglass
18 lineal ft. 1 x 2" pine
12 lineal ft. 1 x 6" pine
3 110v pushbutton switches
3 porcelain light sockets
25 ft. insulated single-strand wire
8 ft. lamp wire/plug
3 hinges
3 11x14" photographs
4 prs. hook & eye
3 sq.ft. sun control film
Assorted lettering

Approximate Cost $90.00

DIRECTIONS SIGN

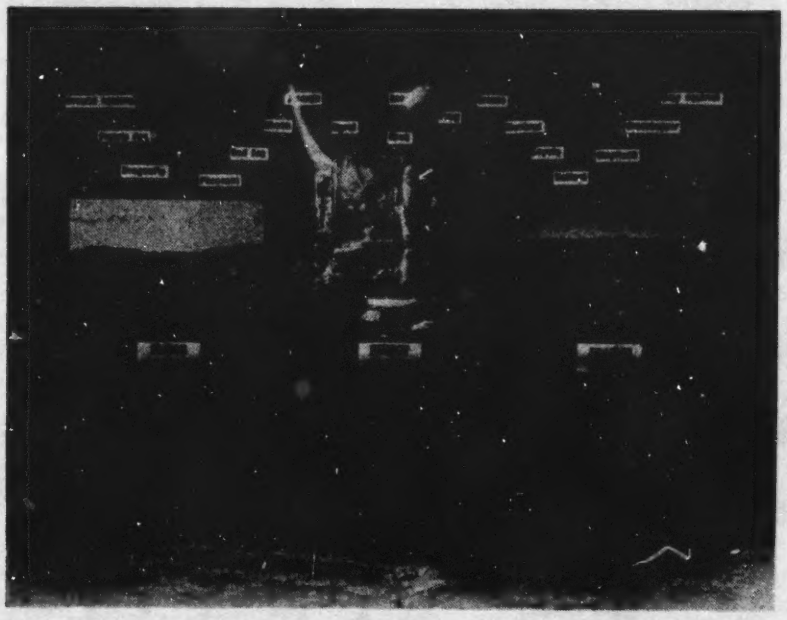
THREE HABITATS

Most animals prefer to live in a particular set of conditions which we call its habitat. Here are 3 pictures which illustrate different habitats and some animals which prefer to live in one of the habitats.

On your Data Sheet after each animal listed, put the first letter of the habitat which you think that animal prefers. You may check your answers by pushing the silver button.

DESCRIPTION

Three pictures of habitats are placed on the upright back and a list of 18 animals are scattered around. Participants are asked to put the animals in their favored habitat. The base portion of the cabinet is divided into 3 compartments each with a light wired into the bottom. The projecting boxes have a transparency with the correct answers stapled to their bottom and a plexiglass cover with sun control film on the under side of the plexiglass. When the participant looks into the box, he can see nothing unless the light is lit and then the answers will be visible. The top of the box is hinged to allow access to wiring and changing bulbs.



HABITAT ACTIVITY 5 - It's A Bitter Wind

MATERIALS

6 sq.ft. 1/2" AD plywood
6 sq.ft. 1/8" plexiglass
10 lineal ft. 1 x 5" pine
12 screws/finishing washers
3 lbs. plaster
Model trees & buildings

Double this list to make the required two models.

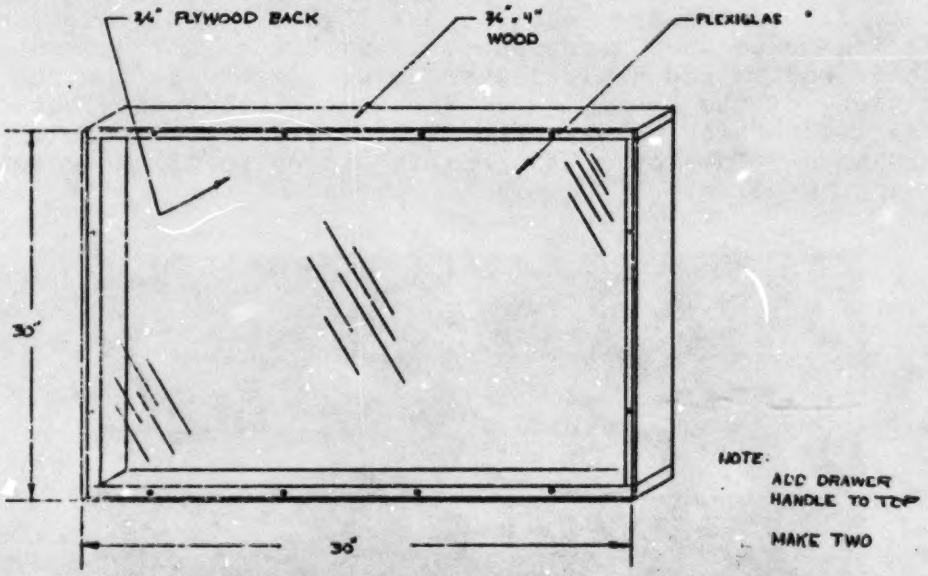
Approximate Cost $25.00 each

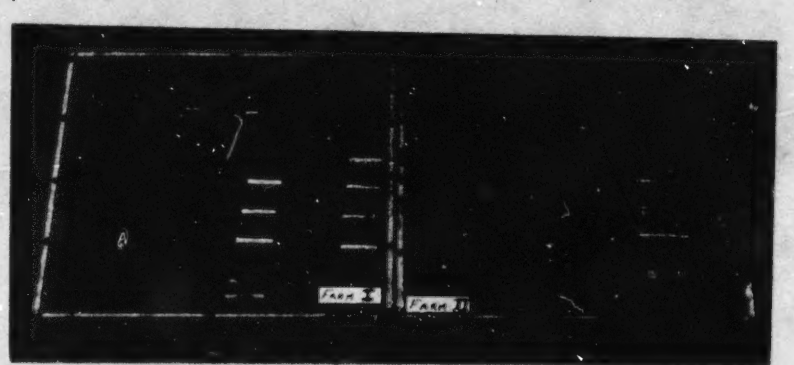
DIRECTIONS SIGN

IT'S A BITTER WIND
Here are two models of farms. One of the farms has a windbreak of shrubs, coniferous and deciduous trees around the farm buildings. The other has scattered trees in the farm yard. Observe the labels which give information about each farm. Record this information on your Data Sheet.

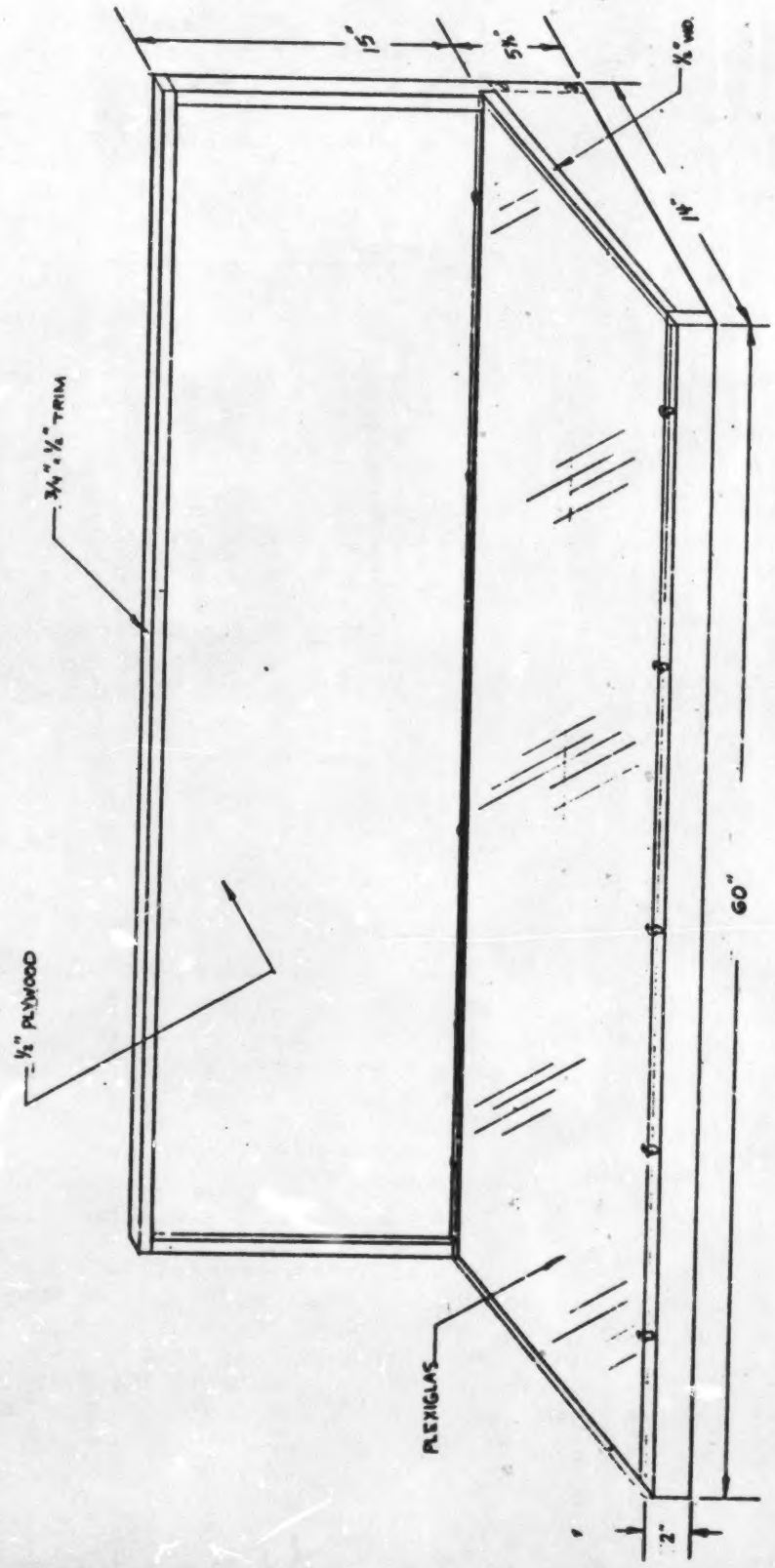
DESCRIPTION

Two 30" x 30" frames are filled with about 1/2" of moulding plaster. This can be textured as it dries to represent cropland, etc. One of the models contains a farmstead of house and barn with scattered trees. The other model has the same farm buildings but has a windbreak consisting of trees and shrubs. The trees are pieces of the summer wildflower yarrow which have been sprayed green. They are drilled and glued into the plaster. The information for the labels can be found in the Teacher Data.





HABITAT ACTIVITY 6 - FOREST SUCCESSION



ALL WOOD IS PINE UNLESS OTHERWISE NOTED.

ACTIVITY 6 - FOREST SUCCESSION (CONT'D)

MATERIALS

17 sq.ft. 1/2" AD plywood
15 sq.ft. 1/8" plexiglass
24 screws/finishing washers
8 lineal ft. 1 x 2" pine
5 lineal ft. 1 x 3" pine
6 8x10 photographs
Assorted letters & numbers

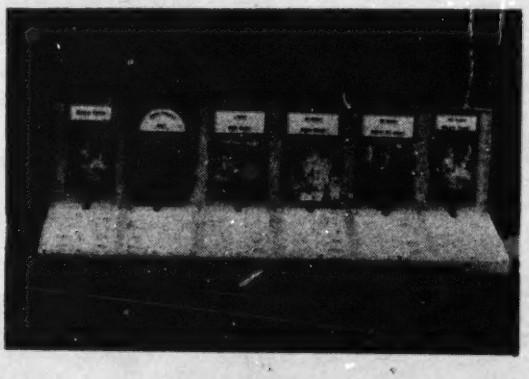
Approximate Cost $65.00

DIRECTIONS SIGN

FOREST SUCCESSION
The pictures in this activity represent what happens to a forest following a catastrophe (fire). The charts below each picture give populations of some animals during that stage of regeneration. Place the population numbers on your Data Sheet.

DESCRIPTION

This activity is a display which shows several stages in forest succession and the resulting animal populations which might be associated with that stage of the forest. One of the stages is a "catastrophe" (fire). The stages of forest succession are shown by 8x10 photo enlargements of the mature forest, the fire, the herb stage, aspen stage, aspen-fir stage and mature forest. The animal populations can be found on the Teacher Data Sheet, P. 18.



HABITAT ACTIVITY 7 - NOW & THEN

MATERIALS

Land Use Map of Minnesota
Original Vegetation Map of MN
30 sq.ft. clear contact paper
12 ft. half round

Approximate Cost $25.00

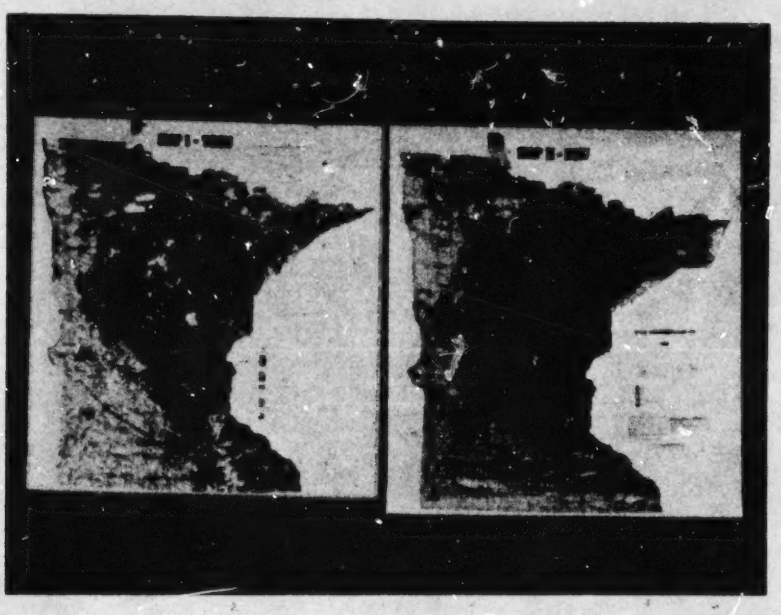
DIRECTIONS SIGN

NOW & THEN
Look at and compare the two maps. Map #1 shows original vegetation before white man. Map #2 shows how the land was used in 1969. Circle the best answer to the questions on your Data Sheet.

DESCRIPTION

The original vegetation map may be available from the U. S. Forest Service or the Department of Geology at the University of Minnesota. The land use map is available from the State Planning Agency, 100 Capitol Square Building, 550 Cedar Street, St. Paul, MN 55101. Just cover them with clear contact paper for protection, put a wooden strip on the top and bottom edge and display the maps. The questions and comparisons should refer to the local area.

ACTIVITY 7 - NOW & THEN (CONT'D)



HABITAT ACTIVITY 8 - NEEDS FROM A HABITAT

MATERIALS

21 sq.ft. 1/2" AD plywood
1 sq.ft. 1/8" plexiglass
4 110v pushbutton switches
25 ft. insulated wire
4 porcelain sockets/bulbs
8 ft. lightwire/plug
16 screws/finishing washers
4 hinges & 2 latches
Model house, police car,
Table setting & faucet

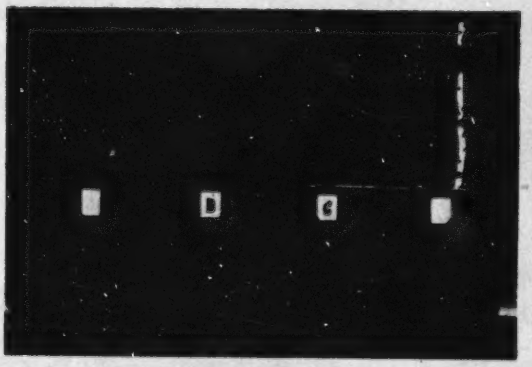
Approximate Cost $54.00

DESCRIPTION

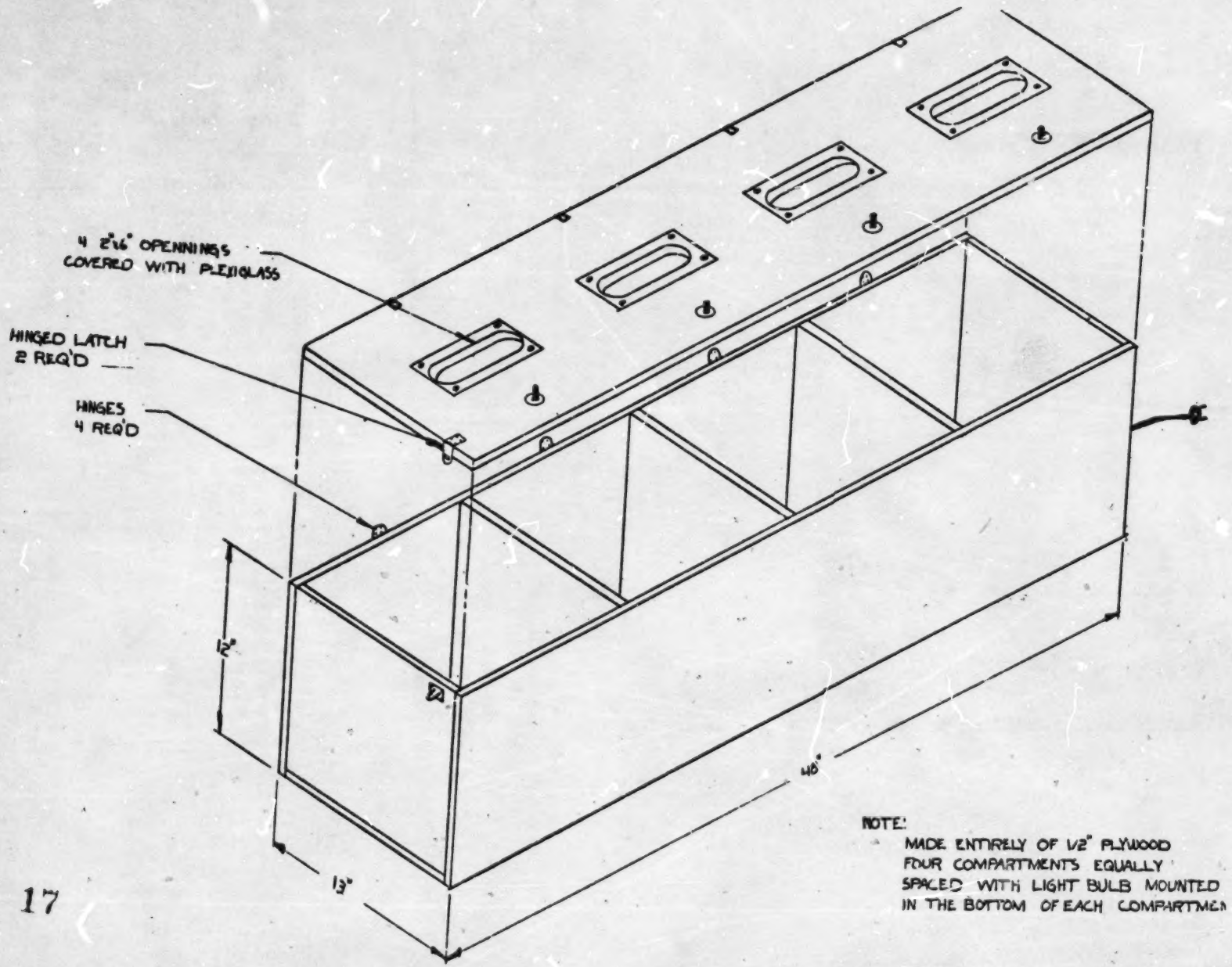
Each of the compartments contains a representation of a habitat need of man. The house represents shelter. The set table represents food, the police car represents protection from predators and the faucet represents water. These are made visible in each square by pushing the button which lights the light mounted on the rear wall of each compartment. The top is hinged for access to wiring and models.

DIRECTIONS SIGN

NEEDS FROM A HABITAT
Here is a box with four windows. Inside each window is a model which illustrates one of the things required of a habitat. Look in each window and identify the habitat requirement. Place the letter of that window in the proper space on the Data Sheet.



ACTIVITY 8 - NEEDS FROM A HABITAT (CONT'D)



NOTE:
MADE ENTIRELY OF 1/2" PLYWOOD
FOUR COMPARTMENTS EQUALLY SPACED WITH LIGHT BULB MOUNTED IN THE BOTTOM OF EACH COMPARTMENT

HABITAT ACTIVITY 9 - NATURAL MONTAGE

MATERIALS

Many pictures of natural things
24 sq.ft. clear contact paper
12 ft. half round

Approximate Cost $5.00

DESCRIPTION

Lots of pictures glued in an overlapping montage. Letters on one axis and numbers on the other axis allow participants to locate pictures of things harmful to the environment.

DIRECTIONS SIGN

NATURAL MONTAGE
On this bulletin board are lots of pictures. There are some which illustrate man's significant impact on his habitat. Pick out as many of these pictures as you can find and list their position by the letter and number grid.

HABITAT ACTIVITY 10 - LIMITING FACTOR

MATERIALS

8 sq.ft. 1/2" AD plywood
1 hollow log
1 steel fence post
1 bluebird house

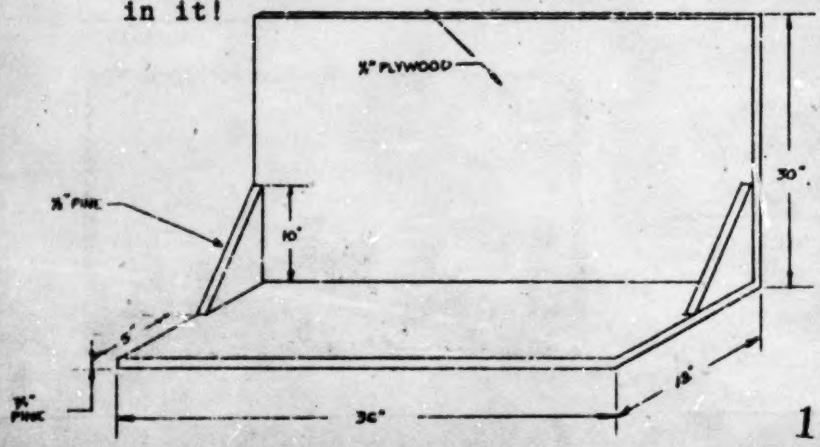
Approximate Cost $10.00

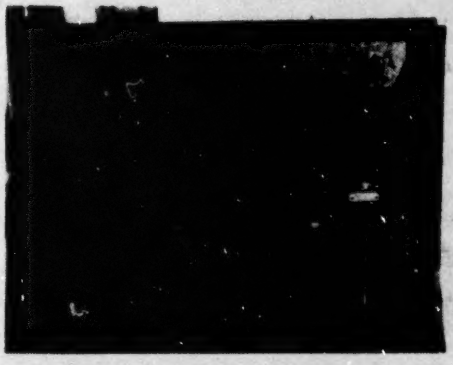
DESCRIPTION

The hardest part is finding a fence post with a bird nest hole in it!

DIRECTIONS SIGN

LIMITING FACTOR
The fence post on the left is the traditional home of the Bluebird. When steel posts replace wooden posts, the Bluebird finds its choice of home sites limited. In order to attract Bluebirds, a constructed house may be substituted. Using this information, answer the questions on the Data Sheet.





HABITAT ACTIVITY 11 - THE VALUE SYSTEM

MATERIALS

24 sq.ft. clear contact paper
15 sheets construction paper
Assorted letters & numbers

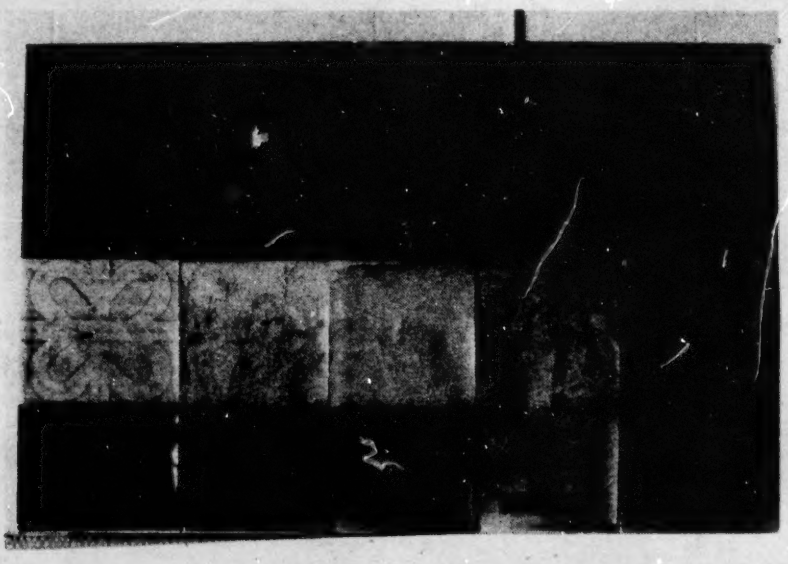
Approximate Cost $7.00

DIRECTIONS SIGN

THE VALUE SYSTEM
This activity shows five possible uses of 40 acres of land. Most of these uses have some sort of value placed on them. Record these values on the Data Sheet.

DESCRIPTION

The photo below this activity shows 5 uses of a 40-acre plot of land. The mathematics are indicated and probably should be updated.



HABITAT ACTIVITY 12 - MYSTERY HABITAT

MATERIALS

6 sq.ft. transluscent plastic
10 lineal ft. of pine corner moulding
2 sheets of black construction paper

Approximate Cost $5.00

DIRECTIONS SIGN

MYSTERY HABITAT
The silhouette you see represents a familiar habitat. Answer the question on the Data Sheet.

DESCRIPTION

Just a cutout of an imaginery skyline glued to the back side of a piece of transluscent plastic.

QUARRY HILL NATURE CENTER

HABITAT SEMINAR

STUDENT DATA SHEET NAME: _____

As you move from one activity to another be sure that you record the data asked for on this data sheet.

ACTIVITY #1 - LAYER CAKE LAKE

1. By reading the temperature column, you can find a layer where the temperature change is quite rapid. List the upper and lower depths where this occurs:
   Upper _____ Lower _____
2. The bass is a warm water fish. What is the deepest depth that you would fish for bass? _____.
3. The trout is a cold water fish. What is the shallowest depth that you would fish for trout? _____.

ACTIVITY #2 - DIRTY WATER

1. Read the light meter under each tube: Tube A _____ foot candles.
   Tube B _____ foot candles.
2. Describe the difference in the water in both tubes.
   The water in Tube A is _____.
   The water in Tube B is _____.

ACTIVITY #3 - MAN OR BEAST

Put the number of the animal in the bottom row most affected by the object or condition shown in the top row:

OBJECT or CONDITION	ANIMAL AFFECTED
A. Blacktop Parking Lot	_____
B. Freeway Fence	_____
C. Intensive Farming	_____
D. Transmission Tower	_____
E. River Dam	_____
F. Clear-cut Forest	_____

ACTIVITY #4 - THREE HABITATS

Place the animal in the habitat which you think it prefers by placing the first letter of the habitat name in the blank following each animal:

Ground Squirrel	___	Antelope	___	Muskrat	___
Prairie Dog	___	Egret	___	Coyote	___
Dragonfly	___	Mink	___	Mallard	___
Pheasant	___	Deer	___	Chipmunk	___
Red Fox	___	Frog	___	Grasshopper	___
Skunk	___	Grouse	___	Gray Squirrel	___

HABITAT SEMINAR DATA SHEET

ACTIVITY #5 - IT'S A BITTER WIND

Farm #1	Outside Windbreak	Inside Windbreak
Temperature		
Wind Velocity		
Wind Chill		

Farm #2	Outside Windbreak
Temperature	
Wind Velocity	
Wind Chill	

Fuel consumed: Farm # 1 _____ Farm #2 _____

List of animals using windbreak for habitat:

_____ _____ _____

_____ _____ _____

If fuel oil cost 40¢ per gallon, how much will Farmer #1 save each year that he has his windbreak? $ _____

ACTIVITY #6 - FOREST SUCCESSION

Fill in the population numbers on the following chart:

ANIMAL	MATURE FOREST	FIRE	HERB STAGE	ASPEN STAGE	ASPEN-FIR STAGE
Deer					
Wolf					
Hare					
Grouse					

On the basis of this information, would you make a statement regarding fire and certain animal populations. _____

_____

_____

ACTIVITY #7 - NOW AND THEN

Observe the two maps and circle the best answer to the following questions:

1. The land in Minnesota that was originally grassland is now used for:

a. mining b. farming c. lumbering d. manufacturing

ACTIVITY #7 - NOW AND THEN (CONT'D)

2. In southwestern Minnesota, the NOW Map shows very few marsh areas compared to the THEN Map. What happened to the marshes?

   a. They were overgrown with trees.
   b. Paul Bunyan moved them.
   c. They disappeared because of drought.
   d. They were drained and used for farming.

3. The original prairie in Olmsted County is now used for:

   a. farming b. boating c. manufacturing d. housing

4. Compare the river bottom forest on the THEN Map with the forested areas on the NOW Map. Why do the forested areas still follow the streams and rivers?

   a. It is a difficult area to farm.
   b. It is in a flood plain.
   c. There is plentiful moisture for trees.
   d. All of these.
   e. None of these.

5. Which areas of original vegetation have been affected by man?

   a. Big woods b. Prairie c. Bogs & Swamps d. Pine groves e. All of these

ACTIVITY #8 - NEEDS FROM A HABITAT

Place the letter of the compartment which illustrates the following habitat requirements:

1. Protection from predators ____
2. Food ____
3. Water ____
4. Shelter ____

List at least one other thing that an animal needs from its habitat _____
_____.

ACTIVITY #9 - NATURAL MONTAGE

Observe the montage and find the pictures which represent those ways in which man may do harm to his habitat. In the chart below, list the location of each picture by its coordinates and what the picture illustrates:

Coordinates		
Number	Letter	Picture of:
___	___	_____
___	___	_____
___	___	_____
___	___	_____
___	___	_____
___	___	_____
___	___	_____

HABITAT SEMINAR DATA SHEET

ACTIVITY #9 - NATURAL MONTAGE (CONT'D)

When you have found 7 of the pictures, move on to the next activity. When you have finished all the activities (1-12), you may come back and find the rest of the pictures.

Coordinates		
Number	Letter	Pictures of:
___	___	_____
___	___	_____
___	___	_____
___	___	_____
___	___	_____
___	___	_____
___	___	_____

ACTIVITY #10 - LIMITING FACTOR

How has man's change in fencing methods affected the life of the Bluebird?

_____

What is the factor which limits the population of Bluebirds today? _____

_____

How can man help? _____

ACTIVITY #11 - THE VALUE SYSTEM

In the chart below list the values derived from the various uses of the 40 acres of land:

A. Highway Cloverleaf _____

B. Corn Crop _____

C. Pasture Land _____

D. Housing Development _____

E. Wildlife Habitat _____

Who speaks for the animals? _____

ACTIVITY #12 - MYSTERY HABITAT

Who lives here? _____.

QUARRY HILL NATURE CENTER

HABITAT SEMINAR

HABITAT IQ QUIZ NAME: _____

The single most important factor in the decline of animal populations is man's impact on the habitats in which those animals live. Man's attitude for many years has been subdue and conquer and we have been successful at modifying the habitat to the benefit of the human animal. Animals have suffered because of our changing of habitats. More recently we are recognizing that the habitat must be shared if we are to maintain populations of wild creatures.

This quiz will test your understanding of habitat and its many factors. Please circle the T (for true) or F (for false) in the left-hand margin.

18-20 correct indicate a good undertanding of habitat.

15-17 correct indicate a fair understanding of problems of the habitat.

0-14 correct indicates a lack of knowledge of habitat problems.

T F 1. The area in a lake where the temperature changes rapidly is called the thermocline.

T F 2. The water in a running stream is not likely to form layers because it is constantly mixing.

T F 3. It is important for fishermen to know where the thermocline is.

T F 4. The depth to which light penetrates a pond or lake is not important to the fish which live there.

T F 5. The feeding activities of the carp may determine the plant growth characteristics of a lake.

T F 6. Although a river dam may be harmful to the movements of fish, it may provide benefits to water fowl and furbearing animals in the pool above the dam.

T F 7. Only a few of the things which man builds in his habitat are harmful to animals.

T F 8. The clear-cut forest is habitat loss in the short run but may be of great benefit in the long run.

T F 9. Most animals have some body features which make them able to live in a particular habitat.

T F 10. A windbreak lowers the temperature behind it.

T F 11. A farmer can save energy by planting a windbreak.

T F 12. Deer and grouse populations seem to be favored by a fire.

T F 13. All forest fires are bad and should be extinguished as rapidly as possible.

T F 14. The two largest vegetation zones in Minnesota are prairie and coniferous (evergreen) forest.

T F 15. Most of the original forest land in Minnesota has been converted to farm land.

T F 16. If an animal can get food and water from a habitat, it doesn't really need the other things.

T F 17. A Bluebird may have trouble making a nest in a steel fence post.

T F 18. It is not possible for man and wildlife to share the same habitat.

T F 19. A housing development on a piece of land will provide a great profit for the developer and also be of great benefit to the wildlife there.

T F 20. Perhaps the largest problem for wildlife today is the destruction and loss of habitat.

QUIZ ANSWERS

1.	T	11.	T
2.	T	12.	T
3.	T	13.	F
4.	F	14.	T
5.	T	15.	F
6.	T	16.	F
7.	F	17.	T
8.	T	18.	F
9.	T	19.	F
10.	F	20.	T

QUARRY HILL NATURE CENTER

HABITAT SEMINAR

TEACHER DATA SHEET NAME: _____

ACTIVITY #1 - LAYER CAKE LAKE

This activity shows the THERMOCLINE in a lake habitat. The THERMOCLINE can be described as a layer in a lake where the water temperature changes rapidly. On this model of a typical deepwater lake, the temperature changes from 59°F at 4 ft. to 49°F at 9 ft. This is a total change of 10° in 5 ft. of depth. From 49° at 10 ft., the temp falls to 45° at 28 ft. This is a change of only 4° in 18 ft. of depth.

Obviously, the warm water fish (bass) will stay above the THERMOCLINE and the cold water fish (trout) will stay below the THERMOCLINE.

The THERMOCLINE remains through the summer until cooling temperatures in the fall lower the temperature of the upper layer to the temperature of the lower layer. At this point, called the fall overturn, all of the water in the lake is the same temperature and mixes throughout the entire depth of the lake. This mixing tends to redistribute food, oxygen and minerals throughout the lake.

ACTIVITY #2 - DIRTY WATER

The light meter reading should be higher below the clear water in Tube A than below the dirty water in Tube B. (A is higher than B.) This is because the particles in the water in Tube B reduce the penetration of the light rays.

There are several implications of reduced light in a pond or lake.

1. The submergent plants require sunlight to photosynthesize. A reduction in sunlight due to turbid water will result in a loss of food production in plants.
2. The process of photosynthesis produces oxygen as a byproduct.
3. Populations of animals in the water may change because of reduced light. For example, bass is a warm water fish requiring 5 to 7 mg/liter of oxygen dissolved in the water. The carp can survive with 2 mg/liter of oxygen. If the light is reduced producing a reduction in photosynthesis and the resultant O_2 liberation, then the bass may disappear and the carp become the dominate fish.
4. Plants form the base of the food pyramind. They are the producers. If the producers decline, then all consumers must also decline. In other words, the food supply declines.

The dirt in water may be from a physical source as soil particles washing in from the watershed or it may be of organic origin. This could be due to bottom feeding fish like the carp stirring up the mud bottom.

ACTIVITY #3 - MAN OR BEAST

This is a simple matching exercise. We consider the best answers to be as follows:

A. Blacktop parking lot: Ground Squirrel
B. Freeway fence: Fox
C. Intensive farming: Pheasant

ACTIVITY #3 - MAN OR BEAST (CONT'D)

D.	Transmission tower:	Migrating birds
E.	River dam	Sunfish
F.	Clear-cut forest	Whitetailed deer

A, B, C and F would affect many of the animals and you may get some argument from students. We think the above are the best answers, but not the only ones. The point of the activity is to think about the things which man puts into his habitat which make things convenient for man, but inconvenient for the animals which share the habitat.

Conversely, some things which man does are of benefit to some animals. For example, the dams on the Mississippi have created pools which provide fine habitat for waterfowl and furbearing animals. Perhaps your students can think of other examples.

ACTIVITY #4 - THREE HABITATS

The correct answers to this activity are as follows:

Ground Squirrel	P	Antelope	P	Muskrat	M
Prairie Dog	P	Egret	M	Coyote	P
Dragonfly	M	Mink	M	Mallard	M
Pheasant	P	Deer	F	Chipmunk	F
Red Fox	F	Frog	M	Grasshopper	P
Skunk	F	Grouse	F	Gray Squirrel	F

Except in a few cases, it should be easy to place the animal in one of the three habitats correctly. A discussion could be centered around what the animal needs from its habitat and what physical adaptations it has which allows it to exist in its preferred habitat. *Example: Egret needs minnows and frogs from marsh. It has long, wading legs; a long flexible neck and a sharp beak for spearing.*

Another method might be to put an animal in the wrong habitat and discuss the problems they would have in living there. *Example: The sharp hooves of the deer would sink into the mucky bottom of the marsh and make locomotion difficult or impossible.*

For additional discussion or written work, have students list one feature (adaptation) for each animal listed which makes it easier for it to survive in its habitat. *Example: Mallard can oil its feathers to keep them waterproof. The mallard has webbed feet for swimming.*

ACTIVITY #5 - IT'S A BITTER WIND

Farm #1	Outside Windbreak	Inside Windbreak
Temperature	+10°F	+10°F
Wind Velocity	30 mph	10 mph
Wind Chill	-33°F	-13°F

HABITAT SEMINAR TEACHER DATA

ACTIVITY #5 - IT'S A BITTER WIND (CONT'D)

Farm #2	Outside Windbreak
Temperature	+10°F
Wind Velocity	30 mph
Wind Chill	-33°F

Fuel consumed: Farm #1 1,105 gallons Farm #2 1,300 gallons

Animals using windbreak for shelter:

Song birds	Woodchuck	Pheasant
Gray Squirrel	Raccoon	

Savings by Farmer #1 $78.00 per year.

The advantages of the windbreak are obvious. Farmer #1 has improved his habitat with the windbreak by causing the wind chill index to drop from -33°F to -13°F. This will make him feel better when out of doors in the winter.

Other implications which can be discussed are:

1. Because the snow will drop into the trees (because of lower wind velocity). The farmer will not have as much snow to plow from the farm yard.

2. The greater snow depth in the windbreak will provide more soil moisture for the trees and thus a more healthy windbreak could be expected.

3. The farmer conserves energy because it takes less fuel to heat his house and to plow the snow in the farm yard.

4. The farmer has provided good habitat for animals while improving his own habitat.

5. The animals being raised by the farmer will be aided by the windbreak because they will require less food to keep warm and will feel better.

6. The slowing of the wind by the windbreak will reduce the wind erosion of the soil.

7. The farmer probablys feels better about his farm because it looks good.

These same advantages can be gained by persons living in the city. The recommended plan is to plant deciduous (broad-leaf) trees on the south-side of the house and coniferous (needled) trees on the north side. The evergreens on the north will reduce the winter winds and reduce fuel consumption. The broad-leaf trees on the south will shade the house in the summer and make it cooler and in winter, when the leaves are fallen, will allow the sun to warm the house.

ACTIVITY #6 - FOREST SUCCESSION

Populations/10 sq. mile

ANIMAL	MATURE FOREST	FIRE	HERB STAGE	ASPEN STAGE	ASPEN-FIR STAGE
Deer	20	10	150	200	100
Wolf	1	1	1	2	1
Hare	100	50	300	500	200
Grouse	40	10	100	1,000	300

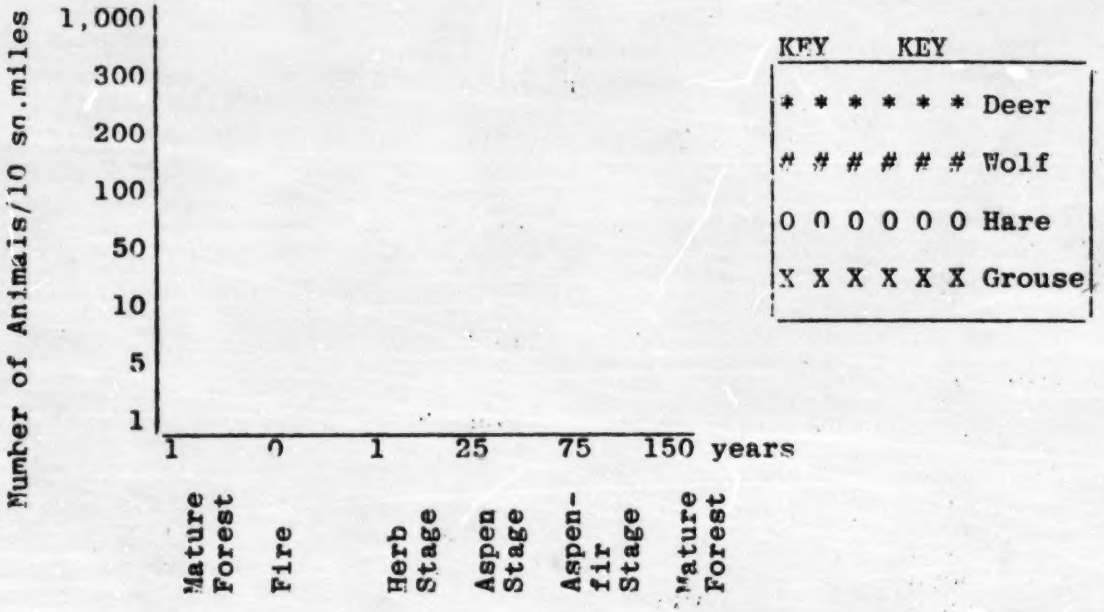
Smokey the Bear is dead! This display is designed to show how fire may affect the populations of some common animal species. The discussion which follows will help you in interpreting the data with your students.

The mature, climax spruce-fir forest lasts forever or until some catastrophe strikes which destroys it. The catastrophe can be fire, disease, man's chain saw (clear-cut) or over a longer haul, a change in climate which favors other species of trees.

The number of animals which can exist in the mature spruce-fir forest is quite small. (See populations above)

After a catastrophe such as fire, an orderly progression of stages occurs called *succession*. These stages are represented in this activity as the herb stage; the aspen stage; the aspen-fir stage and the mature, climax spruce-fir forest. In Minnesota, this series of steps requires up to 150 years.

The animal populations show a dramatic change in numbers as the habitat changes through succession.



ACTIVITY #7 - NOW & THEN (CONT'D)

which affects the wildlife. Of course, all the changes affect the wildlife. Some good and some bad. As mentioned above the prairies have been extensively farmed and many bogs and swamps have been drained for various types of cultivation.

(Suppose man had not arrived on the scene. Would the habitat change?

INTERPRETATION OF THE "THEN" MAP

The map of original vegetation types might more accurately be described as pre-settlement types. The map is based largely on survey notes, descriptions and maps of the original land surveys of Minnesota made by the U.S. General Land Office between 1850 and 1905. Generally, these were made just before settlement. They began in the Southeast before the Civil War and were completed in the Northeast by 1905. Thus the map shows vegetation before it was directly altered by cultivation, commercial logging, or land clearing.

The conditions portrayed are, therefore, those which existed before white man arrived at the scene. Indians had used this part of the country mainly as a hunting ground. Some Indian sugar camp sites were noted in the hardwoods of east-central Minnesota. Aside from this, the Indians hadn't disturbed the original forest cover.

The natural vegetation is in a constant state of change due to gradual plant migrations caused by climatic changes and local successional changes due to fire, windstorms, insect and plant disease. Fires created the most dramatic and widespread and significant short-term changes. Lightning was a cause as well as Indians, fur traders and explorers.

The prairie-forest border was an unstable zone maintained by fire. The whole forest ecosystem of the conifer region required fire to maintain its diversity, productivity and stability. How has man affected fires?

The original vegetation map is available from: U.S. Department of Agriculture, North Central Forest Experiment Station, Forest Service, Folwell Avenue, St. Paul, MN 55108.

ACTIVITY #8 - NEEDS FROM A HABITAT

The answers are as follows:

1. Protection from predators B
2. Food C
3. Water A
4. Shelter D

A habitat must provide certain factors for an animal living in it. This activity illustrates four of those factors. These are illustrated on the basis of man being the animal in the habitat. Of course, man has the same basic requirements as any other animal.

The one factor obviously missing is one dealing with reproductive success. We didn't know how to illustrate it! This might be one listed on the student data sheet as another need. Discussion should center around how a habitat provides for those needs for specific animals.

ACTIVITY #6 - FOREST SUCCESSION (CONT'D)

Students can plot their data on a graph as described above. It will be noted that the peak populations occur 25 years after the fire and last for 30-40 years. The following points could be used for discussion:

1. Discuss possible catastrophes.
2. Would it be better to harvest a mature, climax forest or let it burn?
3. Any clues as to what deer and grouse like to eat?
4. Any clues as to what the wolf likes to eat?
5. How can the high population be maintained?

ACTIVITY #7 - NOW & THEN

1. b. Farming

The original grassland has been extensively used for farmland. In fact, very few areas of original prairie remain today. The original prairies have become some of the best croplands in the world.

(Do you think we should try to preserve remaining prairies?) Why?

2. d. They were drained and used for farming.

With increased demands to cultivate more land, marshes and marginal wetlands were drained and the area used for farming. In many cases this farmland has not been as productive for farmland as farmers desired and it has reverted back to marsh.

(Do you think it's wise to return some land to marshes?)

3. a. Farming

In Olmsted County as in other areas, the original prairie has made the best farmland. d. might also be considered because today people desiring acreages and wanting to get out of the city are buying up this farmland and taking it out of farming.

(What do you think some of the problems are of expanding suburbs and so many people having hobby farms and small acreages?)

4. d. All of these.

Many attempts were made to farm this land and much of it has been used for pasture. Being in a flood plain is a problem when the crops get washed away and the vegetation is not sufficient to check erosion. When the river bottoms were left to succeed the trees returned and have benefitted from the additional moisture.

(Would these be good areas for animal habitat?)

5. e. All of these.

Man has affected all of the areas in Minnesota. Very few virgin stands of forest remain. The original forested areas are now used for lumbering. The changes include types, size and age of trees

ACTIVITY #9 - NATURAL MONTAGE

There are 14 pictures to be found in this montage which shows man's detrimental impact on his habitat. They are as follows:

COORDINATES	SUBJECT
A-1	Polluted river
B-1	Trash & litter
C-1	Old car body
D-1	Draining swamp
A-2	Air pollution (factory)
B-2	Snowmobiler
D-2	Water pollution (sewer pipe)
A-3	Water pollution (sewer pipe)
B-3	Killing endangered species (green turtle)
C-3	Air pollution (factory)
D-3	Litter & trash
A-4	Clear-cut forest
B-4	Polluted stream
C-4	Unwise land use (marina development)

There are no "bad" pictures in C-2 or D-4.

The discussion following this activity might center around what can an individual do about some of these things. You might expect that some students will argue on some of the items shown as undesirable. Those which we can see as questionable are the snowmobile. The marina development and perhaps the clear-cut forest.

We do not consider the pheasant hunter in D-4 an undesirable impact. If there is a shortage of pheasants, it's because of habitat loss and not because of hunters.

ACTIVITY #10 - LIMITING FACTOR

This display illustrates how man has affected the Bluebird. The Bluebird is a hole nester and in the days of the wooden fencepost, there were ample sites for nesting. The holes used by Bluebirds are old woodpecker holes or knotholes, which rot into the soft center of the post.

When man's technology made steel fenceposts more convenient to use than wooden posts, the lack of nesting sites became the limiting factor for the Bluebird. The only reason that the Bluebird population has declined is from the lack of nesting sites. Conversely, if man provides nesting sites like the bird box in this display, the population will increase again.

To put it another way - man's activity in the habitat has removed the traditional nesting site (wooden fenceposts) and man's activity can return these nesting sites by providing bird nest boxes in the habitat.

ACTIVITY #11 - THE VALUE SYSTEM

LAND USE	VALUE
A. Highway Cloverleaf	4,000 cars per hour
B. Corn crop	$10,000.00
C. Pasture land	Approximately $300 per month
D. Housing development	$560,000.00
E. Wildlife habitat	? ? ? ? ? ?

This display illustrates 5 possible uses of 40 acres of land. Each of these uses is a reasonable one and many 40's are being used these ways today. The big question comes, of course, when 40 acres of wildlife habitat is changed to one of the other four uses. In this case, who speaks for the wildlife?

There are many organizations which do speak for wildlife. Libraries have lists of organizations with this type of orientation. If there is a solution to the problem implied in this activity, it most certainly would be to first decide what the land is best suited for and then make a decision as to how the land will be used. To run a highway cloverleaf on rich cropland is not smart if other alternatives are available. Wildlife habitat should be on land which is not suitable for other uses. There is some cropland which is marginal and probably should be allowed to revert to wildlife habitat.

ACTIVITY #12 - MYSTERY HABITAT

Who lives here? Man

Perhaps a discussion of what kind of "wildlife" the urban-industrial habitat might support would prove interesting. Organisms such as dogs, rats and cats; flies, lice and mice; pigeons and sparrows would all be expected in these areas.